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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TSUTOMU TETSUKA, KAZUYUKI IKENAGA, TETSUO
ONO, MOTOHIKO YOSHIGAI, and NAOSHI ITABASHI

Appeal 2009-002780
Application 10/784,275
Technology Center 1700

Decided:¹ May 28, 2009

Before ADRIENE LEPIANE HANLON, CHUNG K. PAK, and
JEFFREY B. ROBERTSON, *Administrative Patent Judges*.

ROBERTSON, *Administrative Patent Judge*.

¹ The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the Decided Date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's final rejection of pending claims 1, 2, 4, 5, 7, 8, and 10-14.² (App. Br. 6). We have jurisdiction pursuant to 35 U.S.C. § 6(b).³

We REVERSE.

Appellants describe a plasma processing apparatus including, *inter alia*, a dielectric that is exposed to the plasma substantially covering a surface portion of an inner wall of a reaction chamber and an electrically conductive member disposed within the reaction chamber, having an area in a range of 0.1% to 10% of the reaction chamber inner wall area. (Spec. 10 and 23).

Claim 1, the only independent claim on appeal, recites:

1. A plasma processing apparatus for processing a substrate with plasma by applying a high frequency to a reaction chamber so as to generate plasma therein, and applying a second high frequency to a substrate holder on which the substrate is placed so as to control the ion energy to the substrate; wherein
a dielectric that is exposed to the plasma substantially covers a surface portion of an inner wall of the reaction chamber, an electrically conductive member is disposed within the reaction chamber so as to be exposed to the plasma within the reaction chamber at a position with respect to the inner wall of the reaction chamber which is covered with the dielectric, and the electrically conductive member is electrically coupled to earth one of directly and through the inner wall of the reaction chamber so as to form a DC earth which enables direct current to flow therein from the plasma, the electrically

² Claims 3 and 6 have been canceled. Claim 9 was withdrawn from consideration as being directed to a non-elected invention. (Appeal Brief filed March 18, 2008, hereinafter "App. Br.," 2).

³ Oral arguments were heard in this Appeal on May 13, 2009.

conductive member has an area in a range of 0.1% to 10% of the inner wall area of the reaction chamber, a magnetic field generation means is disposed outside of the reaction chamber so as to apply a magnetic field to the plasma, and the electrically conductive member forming the DC earth is disposed at a position crossing a magnetic line of force that is closer to the substrate holder than a magnetic line of force that crosses the inner wall of the reaction chamber having the dielectric thereon.

The prior art relied upon by the Examiner in rejecting the claims on appeal is:

Kawasaki	4,795,529	Jan. 3, 1989
Kadomura	US 6,391,437 B1	May 21, 2002

The Examiner rejected claims 1, 2, 4, 5, 7, 8, and 10-14 under 35 U.S.C. § 103(a) as being unpatentable over Kadomura in view of Kawasaki. In rejecting the claims, the Examiner found that Kadomura describes a plasma processing apparatus including a dielectric layer that covers a surface portion of an inner wall of the reaction chamber, but does not teach an electrically conductive member that has an area in a range of 0.1 % to 10 % of the inner wall of the reaction chamber as recited in claim 1. (Examiner's Answer entered May 28, 2008, hereinafter "Ans.," 3-5). The Examiner found that Kawasaki teaches a plasma processing apparatus including an electrically conductive member. (Ans. 9). The Examiner determined that it would have been obvious to add Kawasaki's electrically conductive member to the apparatus of Kadomura, and "to optimize the exposed/unexposed surface area as claimed." (Ans. 9-10). The Examiner stated that the motivation for adding Kawasaki's electrically conductive member was "for optimal ionic acceleration and control as taught by Kawasaki." (Ans. 10).

Appellants contend that Kawasaki provides no disclosure, including in the drawings, that the electrically conductive member has an area in a range of 0.1% to 10% of the inner wall area of the reaction chamber recited in claim 1. (App. Br. 9 and 10; Reply Brief filed July 28, 2008, 7).

ISSUE

We frame the issue presented as: Have Appellants shown reversible error in the Examiner's determination that it would have been obvious to one of ordinary skill in the art to add Kawasaki's electrically conductive member to Kadomura's plasma processing apparatus such that the electrically conductive member has an area in a range of 0.1% to 10 % of the inner wall of the reaction chamber?

We answer this question in the affirmative.

FINDINGS OF FACT

The record supports the following Findings of Fact (FF) by a preponderance of the evidence.

1. Appellants' Specification states:

Therefore, in general, chipping of the side walls can be effectively suppressed by providing a conductive member with an area corresponding to approximately 0.3% to 2.5 % of the sidewall area that functions as an effective earth for the bias high frequency. However, when considering the difference between the various equipment configurations, such as between a parallel plate plasma equipment and an induction RF plasma equipment, it is considered desirable to provide a conducive material having an area of less than approximately 10% of the while reaction chamber wall area to

function as the effective earth for high frequency to obtain advantageous results without fail.
(Spec. 23).

2. Kadomura describes a plasma processing apparatus including a dielectric layer that substantially covers a surface portion of an inner wall of the reaction chamber. (Col. 45, l. 56 – col. 46, l. 60; col. 41, ll. 7-14).
3. Kawasaki is silent as to the effect of the electrically conductive member area on ionic acceleration and control of the plasma treating apparatus. (Col. 2, ll. 3-34).
4. Kawasaki describes a plasma treating apparatus having “[a] ground electrode **11** [that] is disposed around the outer periphery of the electrode **5** and electrically insulated therefrom. One end of this ground electrode **11** is positioned near the sample table **5a** while the other end is grounded.” (Col. 3, ll. 49-53).
5. Kawasaki is silent as to the relationship between the area of the ground electrode (electrically conductive member) and the inner wall area of the reaction chamber. (*See FF 2 and Kawasaki, generally*).
6. Kawasaki’s Figure 7 is reproduced below:

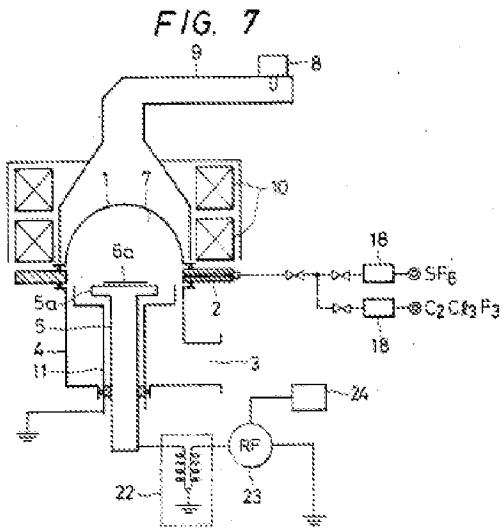


Figure 7 is a structural view of a plasma treating apparatus including discharge tube 1, vacuum treating vessel 4, ground electrode 11, outer electrode 5, and sample table 5a.

(Col. 3, ll. 25-65; col. 9, ll. 7-18).

PRINCIPLES OF LAW

“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”” *KSR Int'l. Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007), quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006).

ANALYSIS

The Examiner states that the features of Kawasaki's drawings are not drawn to scale, and that Kawasaki's electrically conductive member has a smaller area percentage than the inner wall area of Kawasaki's reaction chamber. (Ans. 14). The Examiner also states that one of ordinary skill in

the art would have found it obvious to “optimize the dimensions for example to accommodate varying sized substrates and/or reduce apparatus’ working area relative to the rest of the fabrication facility.” (Ans. 15). However, the Examiner provides no rational underpinning as to why one of ordinary skill in the art would have “optimized” Kawasaki’s electrically conductive member to have an area of 0.1 to 10% of the reaction chamber inner wall area as recited in claim 1. Kawasaki’s only description of the electrically conductive member is silent as to the area it occupies within the reaction chamber. (FF 4 and 5). Moreover, the portion of Kawasaki relied on by the Examiner as motivating one of ordinary skill in the art to add Kawasaki’s electrically conductive member to the apparatus of Kadomura does not relate the area of the electrically conductive member to optimal ionic acceleration and control, and provides no indication of the benefits that Appellants obtain by selecting an electrically conductive member area within the recited range. (*See* Ans. 10; FF 1 and 3).

In addition, the Examiner’s argument that “[b]ecause the reference does not disclose that the drawings are to scale and is silent as to dimensions, arguments based on measurement of the drawing features are of little value” (Ans. 14), actually does more to contradict the Examiner’s position than to support it. Kawasaki’s drawings do not describe any particular relationship between the area of the electrically conductive member and the inner wall area of the reaction chamber, much less provide any direction to one of ordinary skill in the art to select an electrically conductive member area in a range of 0.1 to 10% of the inner wall area of the reaction chamber as recited in claim 1. (*See* FF 4 and 6). Therefore, the Examiner has not provided sufficient reasoning that the specifically recited

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electrically conductive member area range would have been obvious to one of ordinary skill in the art.

CONCLUSION

Appellants have shown error in the Examiner's determination that it would have been obvious to one of ordinary skill in the art to add Kawasaki's electrically conductive member to Kadomura's plasma processing apparatus such that the electrically conductive member has an area in a range of 0.1% to 10 % of the inner wall of the reaction chamber.

ORDER

We reverse the Examiner's decision claims 1, 2, 4, 5, 7, 8, and 10-14 under 35 U.S.C. § 103(a) as being unpatentable over Kadomura in view of Kawasaki.

REVERSED

tc

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